REMARKS

This application has been reviewed in light of the Office Action dated July 6, 2004. Claims 71-91, 98, 99 and 151-165 are presented for examination, of which Claims 71, 80, 98, 99, 151, 157 and 163 are in independent form.[1] Claims 91 and 165 have been amended to define still more clearly what Applicants regard as their invention; it is noted that the changes made are merely to clarify the claim language, and do not represent in any way a narrowing of any claim recitation. Favorable reconsideration is requested.

The specification and abstract have been amended as to matters of form. Applicants will gladly correct any additional informalities in the specification of which they become aware.

Paragraph 6 of the Office Action is not understood. While the Examiner refers to an Information Disclosure Statement ostensibly filed in this application on February 26, 2003, Applicants have no record of having filed an Information Disclosure Statement on any date in early 2003 (five have been filed, respectively on July 5 and 9, 2001, November 26, 2003, January 20, 2004 and March 2, 2004, all of the forms PTO-1449 from which have been initialed and returned by the Examiner). The PAIR system also does not reflect such a paper. Accordingly, it is surmised that paragraph 6 was included in the Office Action inadvertently.

Claims 91 and 165 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Applicants do not agree with the view expressed in the Office Action that a "signal" is somehow abstract (it is, in fact, inherently a physical phenomenon,

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[1] It is noted that Claim 100 was cancelled by the Supplemental Amendment dated March 16, 2004.

whether electromagnetic radiation, sound or something else, properly formed to carry information that a recipient can take from the radiation or the like and use). For example, what is received by a television receiver or a radio is certainly not merely an "idea", as would seem to be the Examiner's view. Nonetheless, in an effort to eliminate this as an issue, Applicants have amended the preambles of those two claims, which now are directed to a "physically embodied computer program product". This language is plainly directed to something physical and tangible, whether in the form of a CD-ROM or other memory storing executable code. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 71-75, 78-84, 87-91, 98, 99 and 151-65 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 6,222,551 (Schneider et al.), and Claims 76, 77, 85 and 86 were rejected under 35 U.S.C. § 103(a) as being obvious from that patent.

Applicants believe that the claims in the present application are clearly allowable over *Schneider* (and the other cited documents) for at least the reasons set out below, and respectfully requests withdrawal of the rejections of those claims.

Independent Claim 71, by way of example, is directed to a method of operating an apparatus for generating model data representative of a three dimensional model of an object from input signals representative of a set of camera images of the object taken from a plurality of camera positions.

Referring to Figure 1 in the present application and the description at page 26, lines 6-10, page 26, lines 15-19, and page 28, lines 3-14, for example, the camera images in one embodiment may comprise images of the object recorded by a single still

camera at different relative positions to the object, images recorded by a video camera at different relative positions to the object, and/or images recorded by multiple still cameras each having a different position relative to the object. In each case, however, the camera images comprise real images recorded by a camera and not virtual images generated by rendering a three-dimensional computer model of the object.[2]

The method recited in Claim 71 comprises displaying a set of icons, each being associated with respective one of the camera images of the object, receiving a selection signal responsive to user actuation of an input means whereby the selection signal identifies a selected one of the icons, determining a selected camera image from the set of camera images corresponding to the selected icon, displaying the selected image, determining position data representative of a selected camera position from which the selected image was taken, generating in accordance with the model a model image representative of a view of the model from a viewpoint corresponding to the position data, and displaying the model image for visual comparison with the selected image by the user.

In an embodiment, this method allows a user to compare the three-dimensional computer model (by way of a rendered "model" image thereof) with a camera image, so that the user can determine whether any features on the object are shown in the camera image which are not present in the three-dimensional computer model such that the three-dimensional computer model requires refinement to include the features (see, for example the description at page 8, lines 8-21).

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[2] It is to be understood of course that the claim scope is not limited by the details of any embodiment referred to in these Remarks.

The *Schneider* system is a client-server graphics processing system for rendering images of a three-dimensional (3D) model of an object and displaying this to a user. All of the images referred to in *Schneider* are images that have been generated by rendering the 3D computer model -- that is, they are model images. There are no camera images in *Schneider*. More particularly, in the system of *Schneider* the server renders six views of a 3D computer model and transmits the views to a client apparatus. The client displays the six views to a user on the six faces of a cube. The user manipulates the cube using a user-input device to specify a particular view direction. The client sends an indication to the server of the user-specified view direction, whereafter the server renders an image of the model from the user-specified view direction and transmits the rendered image back to the client for display to the user. This operation is explicitly described at col. 2, lines 8-28, of *Schneider*, and it will be understood therefrom that no camera image is ever used in the system of *Schneider* and, in fact, all images that are ever generated, transmitted, and displayed are rendered model images of the 3D computer model.

Part 9 of the Office Action cites Figure 3A and col. 5, line 64, through col. 6, line 4, of *Schneider* as disclosing displaying a set of icons, each being associated with a respective camera image of the object. However, as Applicants have noted above, the six images generated by server 1 and transmitted to a client are rendered images of the 3D computer model -- they are *not* in fact camera images. Accordingly, the images displayed on the surface of cube 4 by the client are the rendered images of the 3D computer model and not camera images (this is explicitly clear for example from the description at col. 2, lines 8-13, col. 4, lines 14-22 and lines 37-59, and col. 5, lines 39-41, etc).

The Office Action further asserts that *Schneider* discloses, in Figure 3A and at col. 3, lines 29-33, and col. 6, lines 5-11,disclose receiving a selection signal responsive to user actuation of an input means whereby the selection signals identifies a selective one of the icons. However, these portions of *Schneider* are actually concerned with the user manipulating a mouse or tracker ball to define a viewpoint relative to the displayed cube, and quite clearly do not disclose, or even hint at, the user selecting one of the displayed rendered images. This is clear from col. 6, lines 5-9, which explains that the display of the cube 4 enables the user to manipulate the cube to select a viewing direction on to the 3D model (that is, to select a viewing direction, and *not* to select one of the faces of the cube). This system provides visual feedback and guides the user in selecting the desired orientation. Indeed, in Figure 3C, and as described starting at col. 6, line 66, the user has set a viewing direction into a corner of the cube 4 (and has therefore quite clearly *not* selected any of the displayed rendered images on the faces of the cube); again, in Figure 3E the user has set the viewing direction to be into an edge of the cube (such that again the viewing direction is not towards any one image on a face of the cube). Accordingly, the portions of *Schneider* cited in the Office Action for selecting a displayed image, do not actually contain any such teaching.

The Office Action also asserts that *Schneider* discloses determining a selected camera image from the set of camera images corresponding to the selected icon in Figure 3A and col. 5, line 64, through col. 6, line 4. However, this portion of *Schneider* merely describes the display of the six rendered images of the 3D computer model received from the server 1 on the six faces of a cube 4. Col. 2, lines 24-28, of *Schneider* explains that, in response to the user defining a view direction, the client sends an indication of the

user-specified view direction to the server, whereafter the server renders an image of the 3D computer model from the user-specified view direction and transmits the rendered image back to the client for display to the user. In other words, the client does *not* respond to the definition of a view direction by the user by determining a selected image from a set of images corresponding to the selected icon, but instead merely "sends an indication to the server of the user-specified view direction".

It will therefore be understood that the assertion in the Office Action that *Schneider* discloses displaying the selected image in Figure 3A and col. 5, line 64, through col. 6, line 4, is also incorrect because none of the images on the face of the cube are selected and displayed. Instead, the user-specified view direction is transmitted to the server which then renders an image of the model from the user-specified view direction and transmits the rendered image back to the client for display to the user.

The Office Action also cites col. 6, lines 5 and 6, and Figures 3C and 3D of *Schneider* disclose determining position data representative of a selected camera position from which the selected image was taken and generating in accordance with the model a model image representative of a view of the model from a viewpoint corresponding to the position data. As already explained above, however, the system of *Schneider* does not select an image and instead merely transmits the user-defined view direction to the client. In fact, as far as Applicants can tell, *Schneider* is totally silent about determining position data representative of the camera position from which an image on the face of the cube 4 was rendered. Col. 6, lines 5 and 6, to which the Office Action refers, merely state that the user manipulates the cube 4 to select a viewing direction on to the 3D model. In the system of *Schneider*, the user is free to specify any view direction and the server then renders an

image of the 3D computer model from that view direction -- not the view direction previously used to render one of the images on the cube 4 displayed to the user at the client. Indeed, if the system of *Schneider* operated in the way asserted in the Office Action, then the server would only ever render images from the same view direction as the six images originally rendered and sent to the client to be displayed on the six faces of the cube 4. Consequently, the whole purpose of the system of *Schneider* would be defeated because, whatever view direction the user selected, the renderer would merely render the 3D computer model from a view direction corresponding to an existing image and therefore send the same image to the user. This is quite clearly pointless as the user would then only ever be able to see the six images originally rendered and displayed on the surface of the cube 4, and not an image from a different view direction.

It is further asserted in the Office Action that *Schneider* teaches at col. 8, lines 58-62, displaying a rendered image of the 3D computer model for visual comparison with a camera image selected by the user. However, that passage actually discusses that it may be desirable to display the cube 4 continually, such as by displaying a small version of the cube 4 in one corner of the display, while displaying the image rendered from the selected viewpoint in a more prominent location on the display. Consequently, the cube 4 showing six rendered images of the 3D computer model may be displayed at the same time as a further rendered image of the 3D computer model. Applicants respectfully submit that nothing has been found, or pointed out, in *Schneider* that would teach, or even hint at, displaying a model image for visual comparison with a camera image, and indeed fails to disclose displaying a model image for comparison with any image selected by a user (because, as explained above, no image is ever selected in the system of *Schneider*).

In summary, it will be understood from the explanation above that not a single element recited in Claim 71 in the present application is disclosed or suggested by *Schneider*, and that that claim is clearly allowable over that patent.

Each of the other independent claims in this application also contains recitations similar in relevant respects to those discussed above with regard to Claim 71, and each of those claims, also, is therefore deemed to be clearly allowable over *Schneider* for at least the reasons given above.

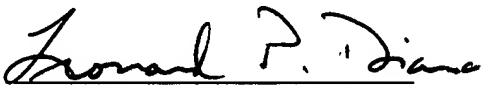
A review of the other documents made of record has not revealed anything that would supply what is missing from *Schneider* as a reference against the independent claims herein, and those claims are deemed allowable over the prior art of record.

The other rejected claims in this application depend from one or another of the independent claims discussed above and, therefore, are submitted to be patentable for at least the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, individual reconsideration of the patentability of each claim on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York Office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,



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IN THE ABSTRACT

Please rewrite the abstract as follows (a clean version of the abstract as amended begins on the next page):

ABSTRACT

~~IMAGE PROCESSING APPARATUS~~

A 3-D model of an object is created by processing images taken from a series of camera positions. An initial sequence of the images is processed to define respective image co-ordinates of matching features to generate a set of model data defining model points in a 3-D space of the model and to obtain respective camera solutions representative of positions and orientations of virtual cameras in the 3-D space defining views of the model corresponding to the images. A new image is added to the sequence and processed to obtain a camera solution for a corresponding new virtual camera for use in generating further model data. ~~Processing of the new image comprises;~~

~~(a) identifying a plurality of image points in the new image which are matched to a respective plurality of image points of at least one preceding image of the sequence for which respective 3-D model data defining corresponding model points exists;~~

~~(b) determining a set of 2-D image co-ordinates of the identified image points in the new image and co-ordinates of respective model points; and~~

~~(c) processing the set of 2-D image point co-ordinates and respective 3-D model point co-ordinates to obtain the camera solution for the new image using a solving process in which the position and orientation of an image plane representative of the new virtual~~

~~camera are calculated from a geometrical relationship in the 3-D model space between model points and the image points defined by the set of co-ordinates.~~